



Overview of Demand Response Fundamentals

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**SMART METERING & DEMAND
RESPONSE WORKSHOP**

Montana Public Service Commission

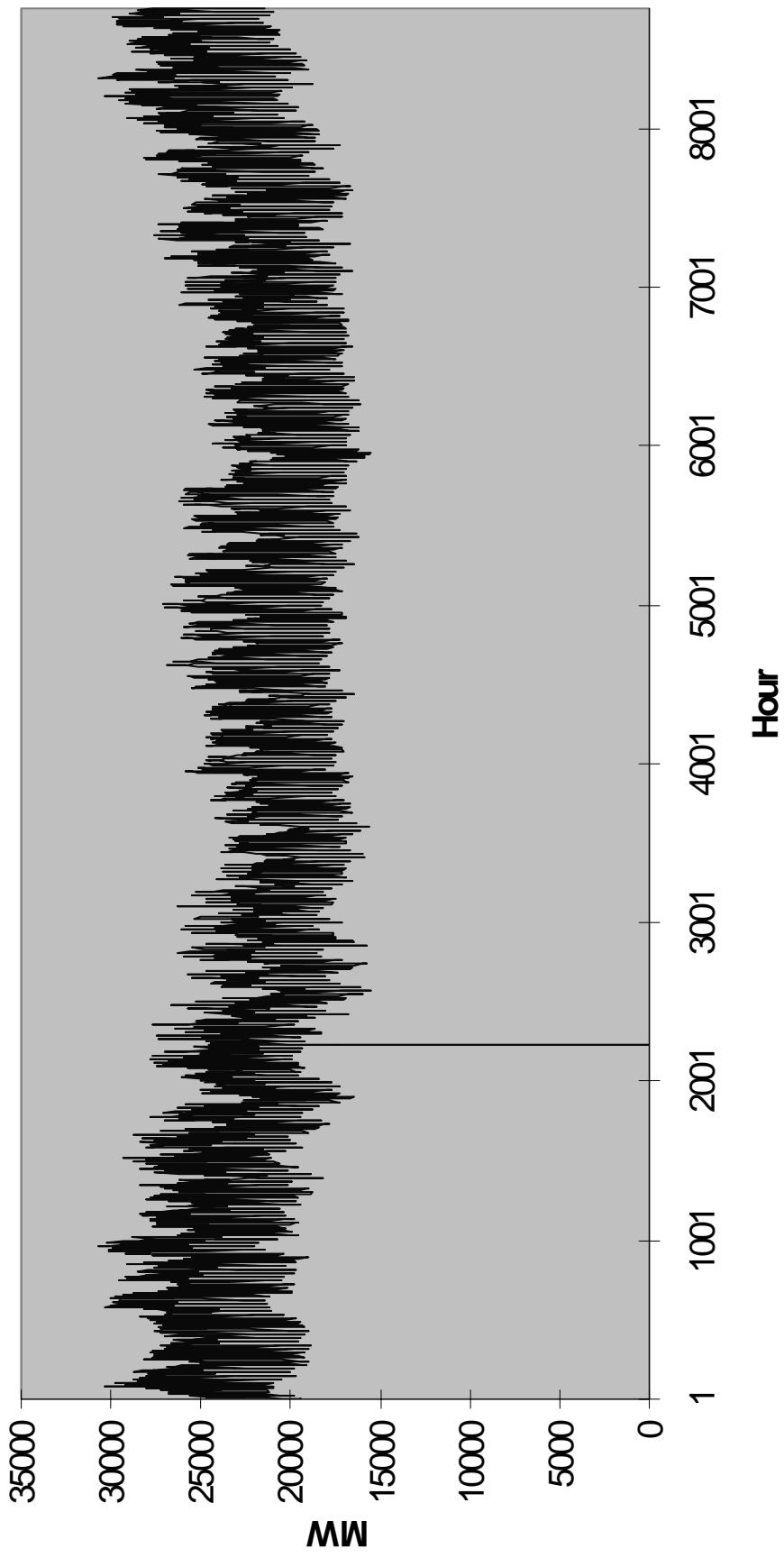
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Topics

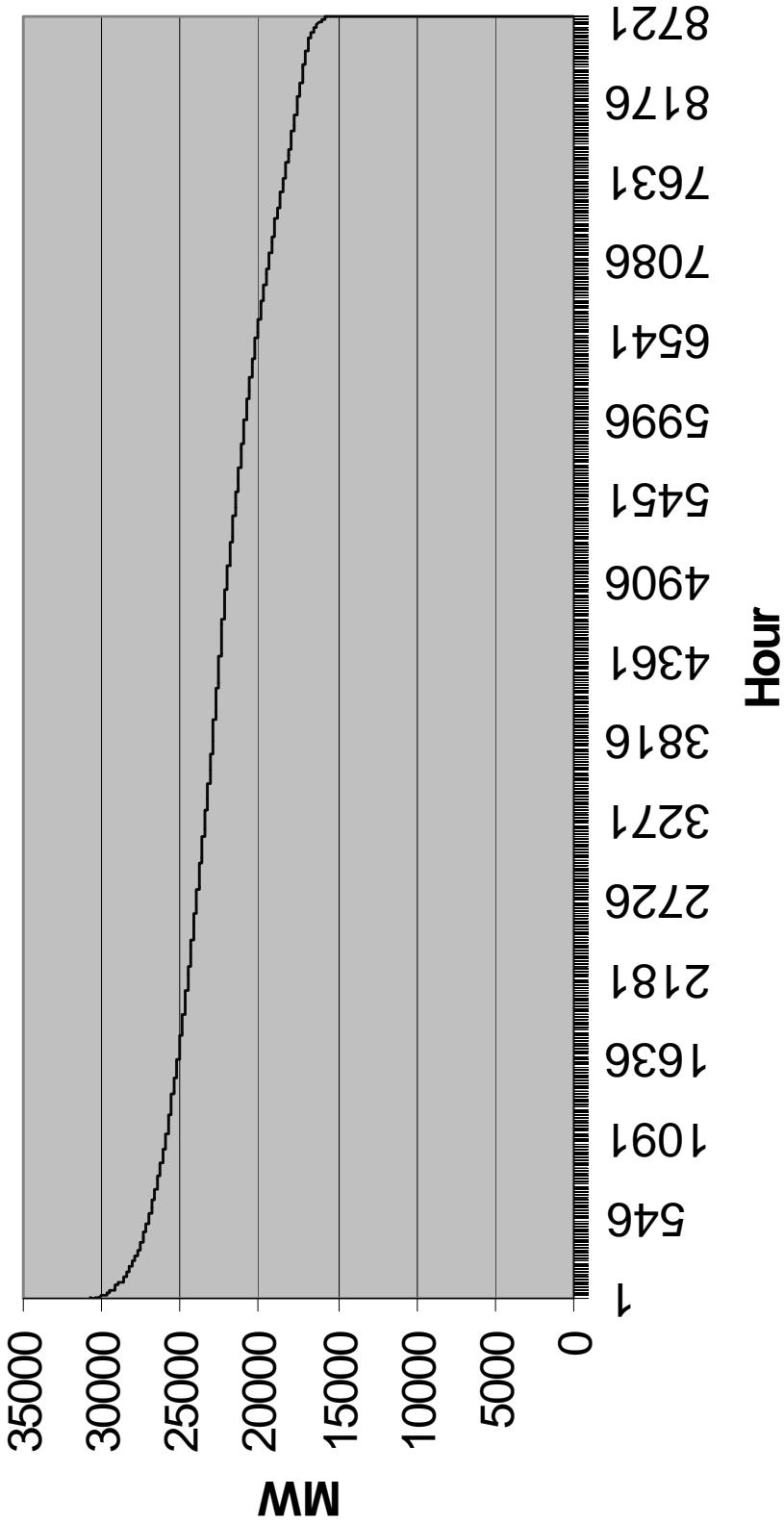
- What's the problem?
- What alternatives do we have?



PNW Actual Loads (1999)



1999 PNW Load Duration Curve

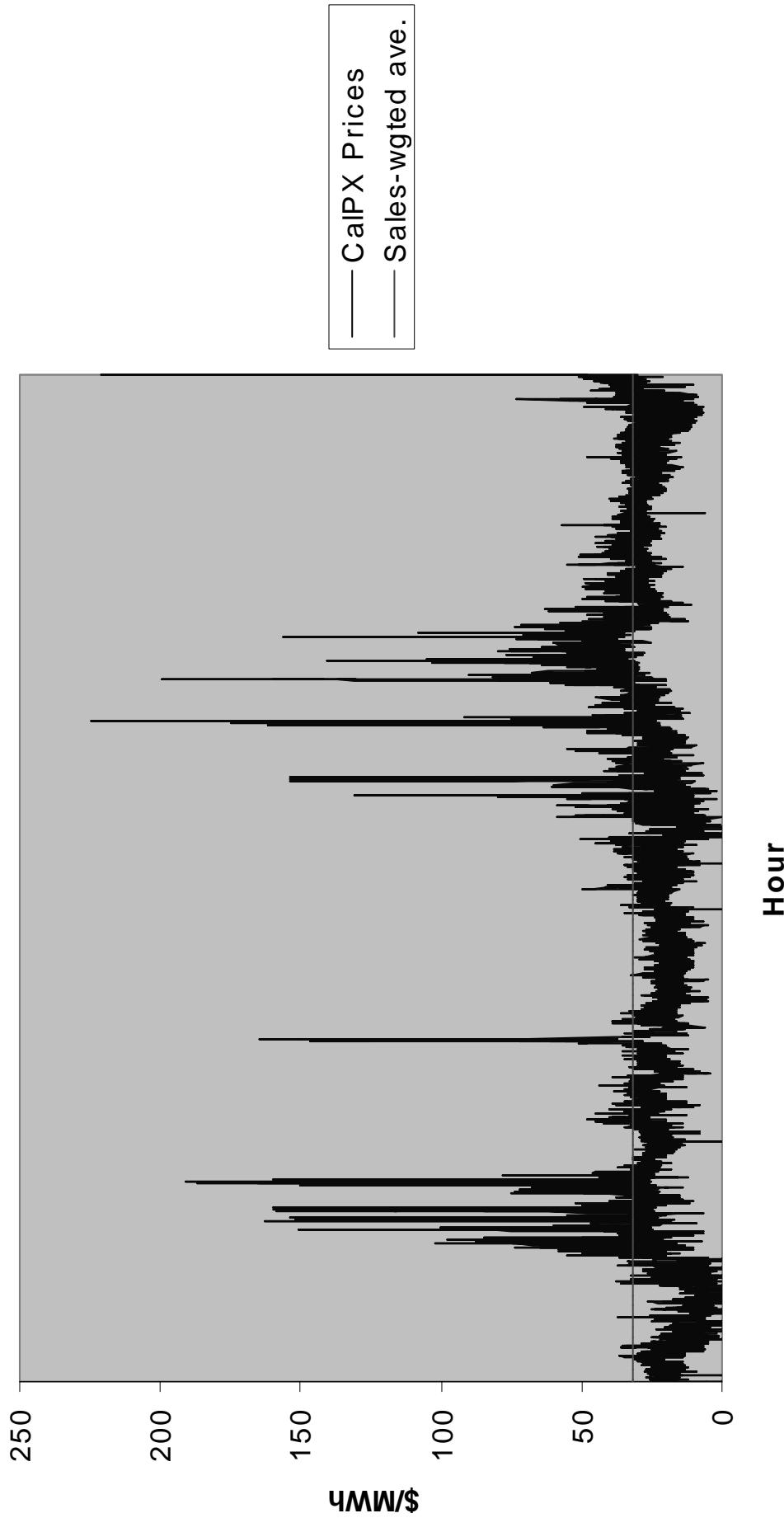


PNW special circumstances

- Historically, hydro system provided lots of peaking capacity, BUT
- Hydro system built out
- Demand continues to grow
- We're becoming more of a thermal power system



CalPX Prices 4/1/98 - 5/22/00



What's the Problem? - 1

- Historical
 - Disconnect between costs and retail price
 - Inefficient use especially at peak demand
 - In old world, utilities could build new generation to meet reliability standards, recover investment
 - Inefficient but reliable -- Stable



What's the Problem? - 2

- Now
 - Retail prices are still inefficient
 - In addition, investment in new generation is riskier
 - Inefficient and unreliable?



What to Do?

Demand Response

- Customer incentive to reduce load on peak and/or when system is stressed
- Compared to generators, very low fixed cost
- Multiple mechanisms
 - Prices
 - Payments



Demand Response ≠ Conservation

- Shares features, but:
 - Doesn't necessarily reduce energy use
 - "Level of service" not necessarily constant
 - We can't draw supply curve, at least yet



Available Mechanisms

- Price
 - Real time prices
 - Time of use prices
- Payments for reductions
 - Buybacks (long and short term)
 - Demand side reserves
 - Interruptible contracts
 - Direct control
- MIXING AND MATCHING ENCOURAGED



Real Time Prices

- Retail marginal cost = wholesale marginal cost (generally hourly)
- Need not apply to all sales
- Advantages of accuracy, transaction cost
- Disadvantages of metering requirements, credibility, volatility, fairness



Time of Use Prices

- Retail cost = average wholesale cost of interval (hours, days, seasons)
- Advantages: predictability, transaction cost
- Disadvantages: less accurate than RTP, metering requirements, credibility, fairness
- “Critical period” flexible variation



Buybacks

- Long term or short term – different situations
- Utility offers compensation, customer responds with commitment
- Advantages: contracted terms, predictability
- Disadvantages: limited potential, transaction cost



Demand Side Reserves

- “Option” for buyback
- Easiest in functioning ancillary services market



Interruptible Contracts

- Old instrument, new purposes (non-emergency)
- New contracts likely to be more complex (what are circumstances for interruption, how often...?)



Direct Control

- Utility has direct control of customer's service
- More valuable to utility than other buybacks
- More costly to customer
=> higher payment necessary



Summary

- Fundamental problem: costs vary a lot,
retail prices don't
- Early days for demand response -- like 1980
for conservation
- Many mechanisms available
- Council's 5th Power Plan: 500 MW by 2009
- Let's get our feet wet

